CONTACT INFORMATION
Mining Records Curator
Arizona Geological Survey
416 W. Congress St., Suite 100
Tucson, Arizona 85701
602-771-1601
http://www.azgs.az.gov
inquiries@azgs.az.gov

The following file is part of the Grover Heinrichs Mining Collection

ACCESS STATEMENT

These digitized collections are accessible for purposes of education and research. We have indicated what we know about copyright and rights of privacy, publicity, or trademark. Due to the nature of archival collections, we are not always able to identify this information. We are eager to hear from any rights owners, so that we may obtain accurate information. Upon request, we will remove material from public view while we address a rights issue.

CONSTRAINTS STATEMENT

The Arizona Geological Survey does not claim to control all rights for all materials in its collection. These rights include, but are not limited to: copyright, privacy rights, and cultural protection rights. The User hereby assumes all responsibility for obtaining any rights to use the material in excess of "fair use."

The Survey makes no intellectual property claims to the products created by individual authors in the manuscript collections, except when the author deeded those rights to the Survey or when those authors were employed by the State of Arizona and created intellectual products as a function of their official duties. The Survey does maintain property rights to the physical and digital representations of the works.

QUALITY STATEMENT

The Arizona Geological Survey is not responsible for the accuracy of the records, information, or opinions that may be contained in the files. The Survey collects, catalogs, and archives data on mineral properties regardless of its views of the veracity or accuracy of those data.

SILVERTON, COLO. 111 C

Quartz monzonite
Intrusive porphyries(monzonitic)
Intrusive rhyolite
Intrusive andesite
Potosi volcanic series;top rhyolite;rest rhyolite,qtz latite,andesite.
Two unconformities.

x x x x x x

Quartz-biotite-latite;mainly an intracaldera formation

x xx x x x

Silverton volcanic series Local
Pyroxene andesite
Burns latite
~~Eureka rhyolite;with latite;probably some welded tuffs~~
Main ore owing to favorable charac eristics,wide extent, intermedia e position in section.Rhyoli e,latite tuffs,
Miocene ~~Eureka rhyolite~~flows,breccias;welded vitreous tuffs breccias, fluidal rhyolite flows.Andesite flows;andesite tuff.

x x x x x x

Eureka rhyolite with latite flows.Possible welded tuffs.

x x x x x

Miocene? San Juan tuff.Fragments andesite,~~xhx~~ latite.No rhyolite

x x x x x

Oligocene? Telluride cgl.Composed of basement fragments.

Main feature of structure is Silverton caldera,from which most of the veins radiate.Go into detail.

Radial rhyolite dikes;in SE part;veins follow andesite or latite dikes,SW part (Arrastre Basin). Sunnyside,rhyp dike postmineral.

Early gangue barite.Mncarbonate,adularia,fluroite kalin,epidote, carbonate. Early metallic minerals: spec.,magnetite,py,arsenop.,ZnS. Next,bulk of qtz,closely followed by tetrahedrire,ccpy,PbS. Finally, barren qtz and alcite. Arentite,proustite at high levels in ore bodies. Enargite. Stromeyerite. Moly.Ccpy.Post-sulfide rhodonite,Sunnyside mine.

LAKE CITY, COLO. IID

Hinsdale volc,series: rhy.,basalt and IM rocks. Probably post-mineral.
x x x x?
Potosi Volc.series. Qtz latites,andesites.

x x x x Major erosion

Silverton Volc.Ser.

Henson tuff: debris of andesite; n places,frags of rhyo.,latite, andesite.

Pyroxene andesite.Massive.
x x x x x x x x xx

Burns latite tuff: mainly ss with volcanic graines. Minor layers of shale,ls.

Eureka rhyo. ore

Picayune volc.group: Andesites,dacites, qtz.latites. Some rhyo.
main ore

Intrusives: Rhyo.,qtz latite,andesite, QMP. Some look like sheets, ot ers appear transgressive.No relation to ore.

Paragenesis: Rhodochrosite-PbS-ZnS;variable py.
Arg.-tetrah.
White cryst.qtz.
Pyragyrite-proustite;probab e argentite.

Structure: Vein frac ures parallel or normal to cotours of major dome.

Ratio 1:62

BONAZA, COLO. IID

~~Younger andesite.Local exposure.Post-mineral?~~
~~Brewer Creek latite: No ore but HT alteration along faults and fissures~~

Possible x x x

N Part	S Part
Younger andesite. Post-mineral?	
Brwer Creek latite	Brewer Creek latite.No ore but HT alteration along fractures.
P ssible x x x x	
Porphyry Peak rhy;IB tuffs	
Squirrel Gulch latite	Squirrel Gulch latite
Bonanza latite Next to Hawley-ore	Hayden Peak latite:local vents
Hawley andesite IB latite Ore	Hawley andesite
Pfec.and Paleo basement	

General:In part of local origin,in part from centers outside district. Intruded by several bodies of latite porph.and granite porph. Many dikes of rhyo.,qtz latite and monzonite. Intruded during or after the faulting. All premineral.

Two types of veins:(1) qtz-high sulfide;PbS,ZnS,ccpy,Ag. (2) qtz-rhodochrosite-fluorite;low sulfides. (1),N part, (2) S part. Dikes along many vein-fractures.

Ratio 1:500

Stomeyerite bornite copy Py + Au-Ag tell Hessite etc
Tennantite + Source of Ag; Pyrargyrite. Enargite ZnS > PbS
Adularia Rhodonite Cal. Ba -

Structure: Broad,rather gentle doming,complex in detail. Supposed major intrusion with laccolithic top under the dome. Antithetic faults,recognized by Burbank. "The zones of most intense mineralization appear to coincide roughly with zones of simple tension,which existed along the border between areas of higly tilted and gently tilted fault blocks".

CREEDE, COLO.

GEOLOGY AND STRUCTURAL CONTROL OF ORE DEPOSITION IN THE CREEDE DISTRICT, SAN JUAN MOUNTAINS,COLO.

T.A.Steven,J.C.Ratté, USGS Prof.Pap.487,1965

8. Gold silver ratio 1:394. Dollar production $57,000,000.

Volcanic Formations

11. Several centers of eruption generally were active during a given interval;type of erption and composition commonly differed from one center to another. Volcanic pile is a complex accumulation of irregularly distributed,locally intertonguing units that are separated here and there by unconformities and cut by faults of several ages.

13. Most of the volcanic activity was accompanied by recurrent subsidence.

44. Fisher QL erupted after last subsidence of Creede caldera,concurrently with the Creede sedimentation and following doming of the calfera core.

First erptuions largely pyroclastic.

45. Feeding neck exposed. Dikes extend SSE from the neck imjected into a zone of echelon fissures of no displacement,parelleling W margine of Creede graben.

Fisher qtz lati e flows on W flank of caldera core were erupted on an outward-dipping slope of the domed core of the caldera on lsopes of 20 or more.

15. Age of youngest premineral rock,Creede formation,very early Miocene to very early Pljocene,according to one;middle Pliocene according to another.

Structure

50.Structural features largely the result of recurrent subsidence related to voluminous ash-flow eruptions or to postsubsidence doming and faulting.

Earliest subsidence La Garita cauldron-voluminous ash-flow eruptions,depositing Outlet Tunnel member of La Garita QL. Deformation accompanied subsidence-jumbled fault blocks,normal faults.

53 Erption of the great mass of pumice and ash = Bachelor Mt. thy.culminated in complex subsidence near town of Creede. Concentric faults and brecciated areas. N to NW faults,along trends of Bulldog Mt.,Amethyst and Solomon-Holy Moses faults.

57 San Luis Peak cauldron related in time to eruption of Rat Creek and Nelson Mt.QL. Subsided,resurgence. E-W Equity fault formed as a result of magmatic intrusion at depth causing resurgence of San Luis Peak cauldron to the north. Fault dips N;some segments of HW block uplifted much more than were adjacent segments. Laterno mal movements on faults of the Creede graben reactivated some earlier faults, reversing direction of
58 displacement on some and increasing relative displacement on others.

Creede caldera nearly circular, 10-12 mi.diameter.Core has been strongly domed.Subsidence recurrent duing eruption of Farmers Creek rhy and succeeding intracaldera formations. Last subsidence accompanied and follow-
59 ed erutption of the Snoeshoe Mt. QL. Involved all the core. Highly faulted zone marking caldera margin exposed only locally.

CREEDE

Geographic Distribution

W or S ←

Fisher qtz latite (0-800' flows, breccias.

E or N →

Creede form (0-2000' seds)

DOMING OF CREEDE CALDERA CORE

RECURRENT SUBSIDENCE OF CREEDE CALDERA

Snowshoe Mt. QL (continued to core of Caldera)
Main subsidence of Creede caldera.

Nelson Mt QL
(0 - 1200'+ welded Tuff

Rat Creek QL
(0-700' welded tuff & tuff)

Subsidence & then resurgence of San Luis Peak cauldron (± 6 mi N of center of ore district)

Wason Park rhyo (0-650' welded Tuff

Huerto formation
(0-3000' of dacitic flows & breccias

Shallow Creek rhyo
(0-500' Flow & neck

Mammoth Mt. rhyo (0-1300'+ of welded Tuff & Tuff.

Farmers Creek rhyo (0-1000'+ of welded Tuff & tuff

SUBSIDENCE OF BACHELOR MT. CAULDRON

(About 3.5 mi. S of center of ore district; about 1/2 way to N edge of Creede caldera)

Shallow Creek QL. (0-1000' of flows & breccia)

Bachelor Mt. rhyo
Windy Gulch member
(0-700' of Tuff
Campbell Mt. member
(0-1100' of welded Tuff)
Willow Creek member
(0-2000'+ of welded Tuff)

La Garita QL
Phoenix Park mem.
(0-500' of welded Tuff)

Rhyo of Miners Creek
(0-1000'+ of flow & breccia)

SUBSIDENCE OF LA GARITA CAULDRON

(about 3 mi NE of center of ore district).

Outlet Tunnel member (0-2000' of welded Tuff

Main subsidence was concurrent with and followed eruption of Snowsho MT,QL.During this time over 6000' of welded tuff accumulated in the core;none outside. Core of caldera sank as a cylinder concurrent with this accumulation.

60. The Solomon-Holy Moses fault zone is the only one in the Creede graben positively known to have beeb active in intracaldera time.

62. Doming of the Caldera Core.* After final subsidence of the caldera core was domed so that highest parts near the center stand 4000' above the moatlike margin. Compex grabe deeply infaulted to form a broken keystone above the center of the domed core. E part is a simple halfdome,,W part = tilted,warped blocks whose aggegate form is half dome but which show complexities in detail.

63 Cause of doming.- Ascribed to magmatic pressure.Fisher QL erupted around W,S and NE sides of the caldera.63:"Doming resulted in marked d stension of the caldera core,as indicated by the deeply infaulted crestal graben."

Late faulting in Creede graban .-Last faulting in the district took place after deposition of Creede formation and Fisher QL;it followed caldera subsidence and attendent doming or uplift due to magmatic intrusion. All know movement took place in the Creede graben.

Faults active at this time were in part coincident with earlier faults,in part near the trends of earlier faults,in part independent of earlir faults.

64 Movement on Alpha Corsea r fault zone took place post-Fisher QL.
65 Amethyst fault zone acgive during this period.

69. Age of Mineralizat on-toward end of per od of faulting.

69.Amethyst Vein Minerals.- Amethyst where seen was mineralized fault breccia:silic.CR frags in matrix of clay,chlorite ,amethystine qtz., white qtz and sulfides. Vugs,crusts around rock frags. PbS,ZnS,py. IM movements. Minor fluorite,rhodochrosite. Barite. Ccpy.

Note from Bull.718: P.100 Barite in nearly all vein outcrops;extends to deepest levels of Bacheolor and Commodore mines.